Dec. 26, 1939. F. J. JUMPER ET AL 2,185,168

RAILWAY CAR END STRUCTURE

Filed March 7, 1938 4 Sheets-Sheet 1

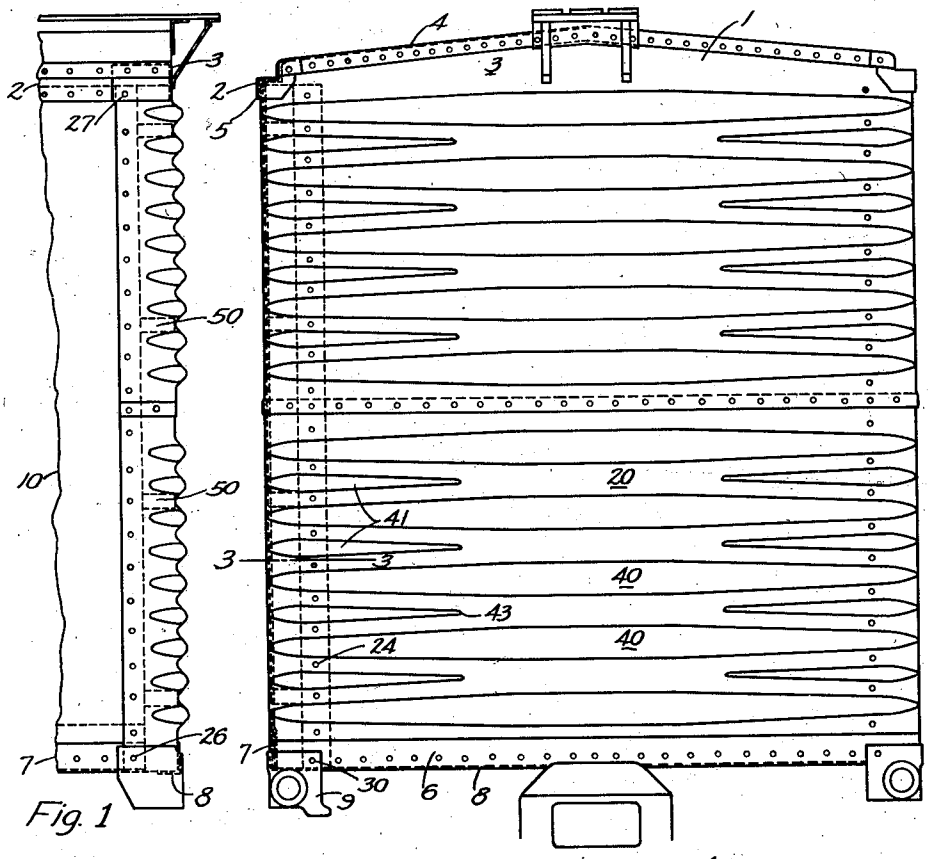


Fig. 1

Fig. 2

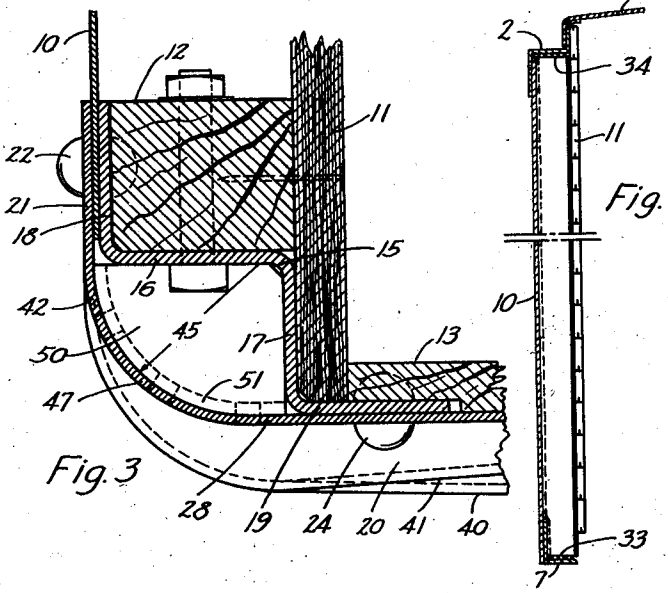


Fig. 3

Fig. 4

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RAILWAY CAR END STRUCTURE

Filed March 7, 1938 4 Sheets-Sheet 2

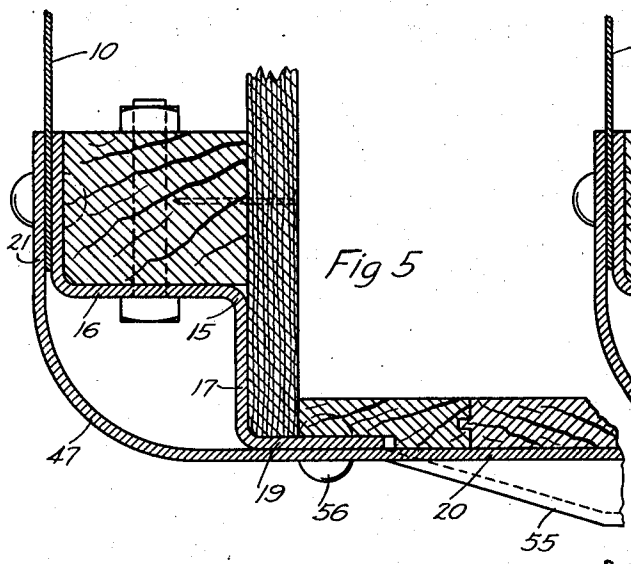


Fig 5

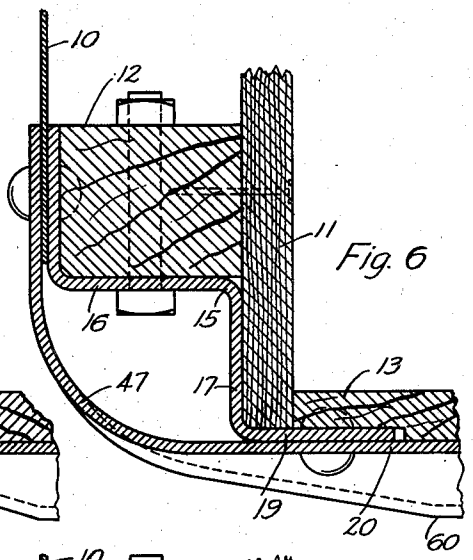


Fig. 6

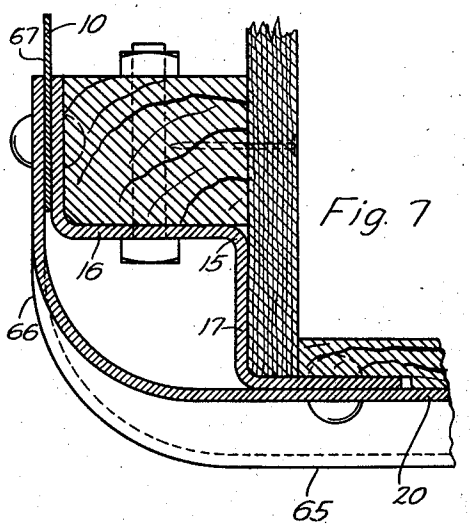


Fig. 7

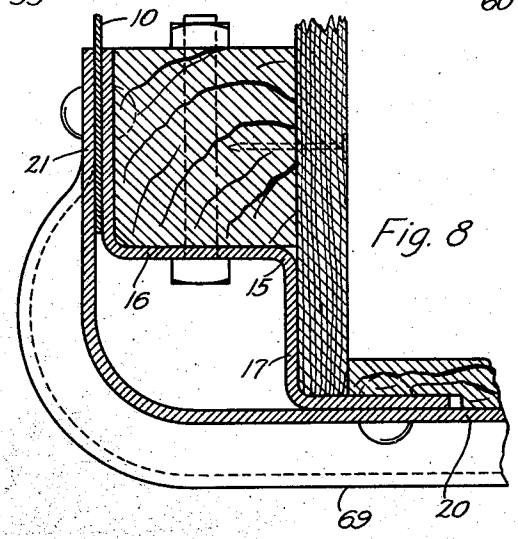


Fig. 8

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RAILWAY CAR END STRUCTURE

Filed March 7, 1938 4 Sheets-Sheet 3

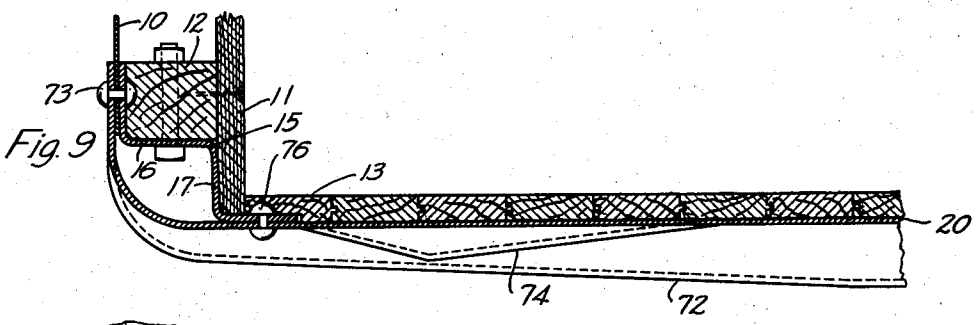


Fig. 9

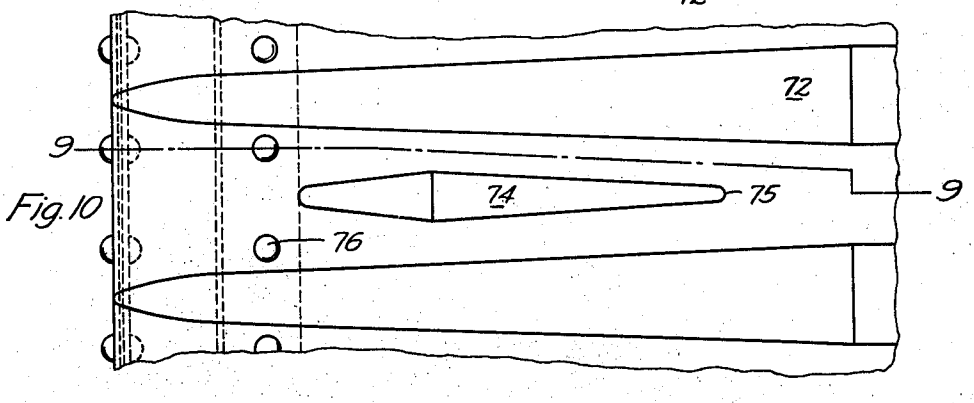


Fig. 10

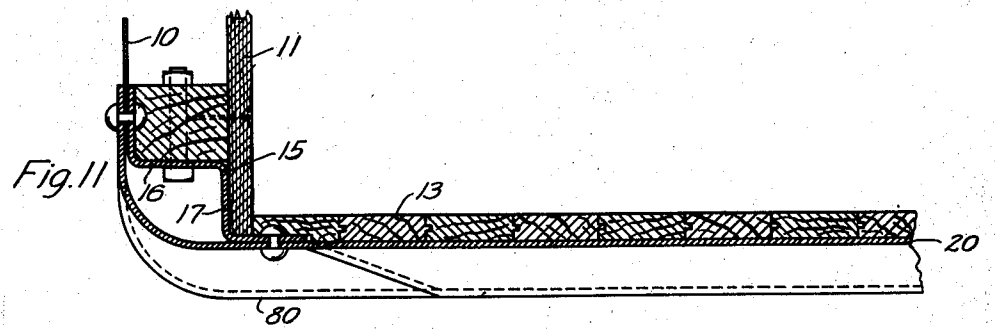


Fig. 11

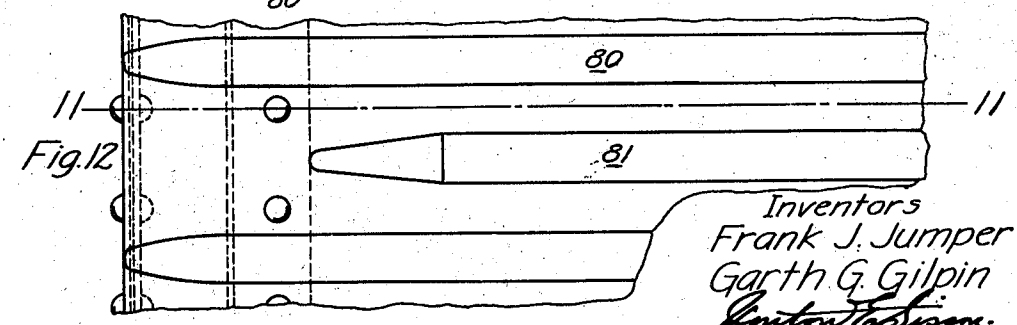


Fig. 12

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RAILWAY CAR END STRUCTURE

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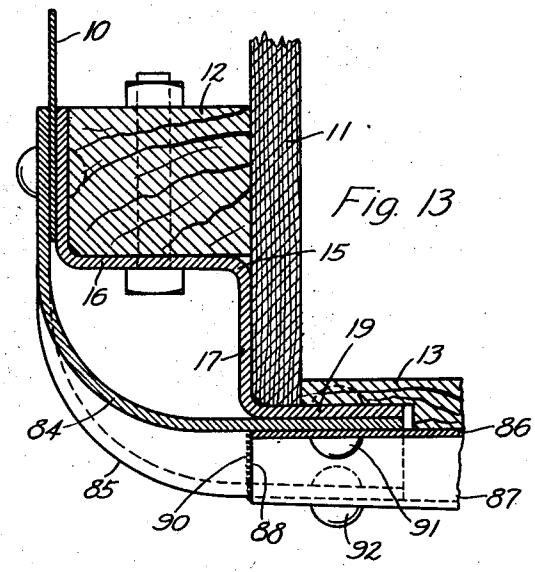


Fig. 13

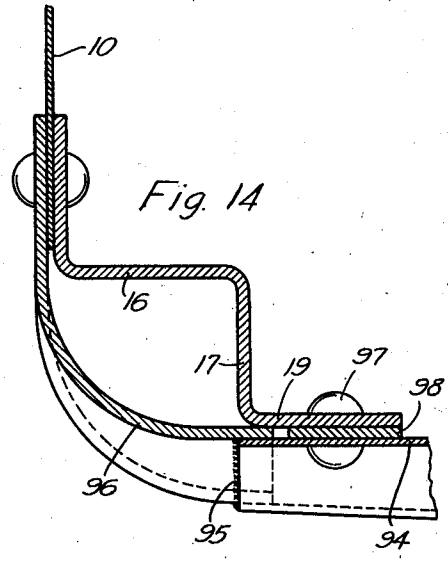


Fig. 14

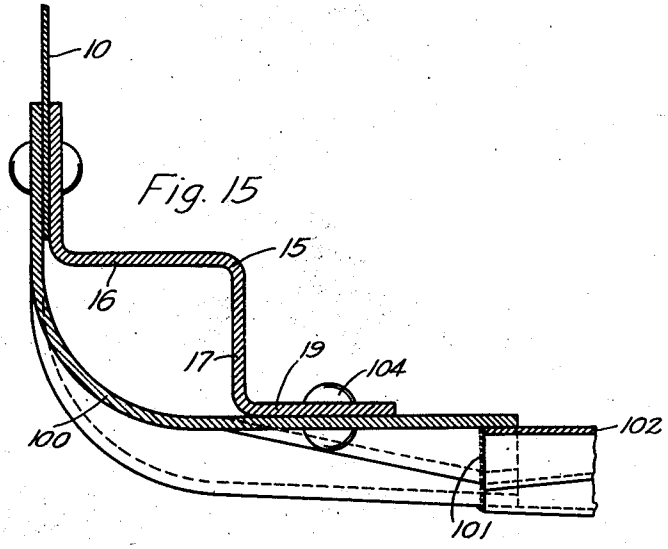


Fig. 15

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UNITED STATES PATENT OFFICE

2,185,168

RAILWAY CAR END STRUCTURE

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Application March 7, 1938, Serial No. 194,360

14 Claims. (Cl. 105—410)

The invention relates to railway house cars, such as box, automobile and refrigerator cars, and has for its object to provide very strong corner posts for use with a car end wall made of relatively thin metallic sheets and provided with a plurality of substantially parallel horizontal corrugations, which corrugations form a plurality of beams between the opposite corner posts of the car to resist a shifting load and to keep the car in square. More specifically the object of the invention is to provide a corner post which is so formed and has its opposite ends so secured to the roof structure and underframe structure, respectively, as to provide a very strong semi-restrained beam between these structures to resist forces in any horizontal direction and to also secure the corner post to these structures so as to prevent it from rotating about its vertical axis, or in other words, to resist torque.

A shifting load in a railway freight car exerts a horizontal force against the end wall and if the end wall deflects outwardly the middle portions of the corner posts are pulled inwardly, while the tops and bottoms, respectively, of the corner posts are held in position and prevented from coming toward each other by the end plate and end sill, respectively, thus causing a bowing or horizontal beam action on each corner post. Railway cars are frequently "cornered" in service; that is, some outside object is thrown against the corner post (or the car is thrown against the outside object) causing a horizontal force to be exerted toward the inside of the car.

Each corner post is also a strut of the overhanging portion of the side truss of the car; (that is, the portion beyond the body bolster) and as such must act as a column or compression member between the side plate and side sill of the car.

A further object is to associate the vertical marginal portion of the corrugated metallic sheet end wall with a vertically disposed member to form a box structural beam and column between the roof structure and the underframe structure, which combined structure functions as a corner post to resist the forces heretofore mentioned, and a further object is to attach the ends of the corrugations (in the end sheet) to the opposite box structural beams so as to cause the corrugations to function as restrained, or semi-restrained beams, thus materially increasing their beam strength.

A further object is to extend the corrugations in the above mentioned corrugated metallic sheet end wall so that any load imposed thereon is transmitted partially to the vertical member adjacent the inner margin thereof and partially to the vertical member adjacent the outer margin thereof, and a further object is to reinforce such outer margin by rigidly securing it to the side wall sheathing, thus effectively transmitting part of the load imposed upon the corrugations to the side wall of the car.

A further object is to secure one of the elements of the aforesaid box structural beam to the metallic side wall sheet so as to obtain cooperation therebetween to resist the various stresses to which a car is subjected in service.

A further object is to associate the corrugations with the corner post so as to transmit at least a part of the stresses imposed thereon to the side wall sheet.

A further object is to form the vertical marginal portion of the corrugated end wall sheet with a lateral flange formed on a relatively large radius to form in effect an arch between the vertical margins of the inside vertical member to resist exterior horizontal forces. Such large radius would also enhance the appearance of the car.

A further object is to form a box structural corner post for a railway car consisting of an inner member comprising angularly disposed portions and an outer semi-cylindrical member having its vertical margins secured to the angularly disposed portions, respectively, of the inner member to form a box structural beam to resist horizontal forces and also to form a vertical column, and a further object is to form such outer member with horizontal corrugations to stiffen the arch structure, and a further object is to match or register the corrugations in said outer member with corrugations in an end wall sheet to form a continuation thereof. Another object is to provide horizontal stiffeners between the inner and outer members of the corner post to maintain the members in their proper relative position to each other.

In the drawings:

Fig. 1 shows a typical end wall for a railway car made of a metallic sheet formed with a plurality of horizontally disposed corrugations with the end wall sheet thereof attached to one modification of our improved corner post.

Fig. 2 is a fragmentary side view of the car shown in Fig. 1.

Fig. 3 is an enlarged section on line 3—3 of Fig. 2 showing a typical form of our improved post.

Fig. 4 shows an elevation of a part of the car shown in Fig. 1 with the corrugated end wall sheet removed.

Figs. 5 to 15 inclusive show modifications of our corner post hereinafter described.

The drawings show the usual parts of the car, such as the roof structure 1 (including the side plates 2; end plates 3 and roof proper 4; corner casting 5 and other associated elements); the underframe structure 6 (including the side sill 7; end sill 8; corner casting 9 and other associated elements); side wall sheet 10; side lining 11; side lining nailing strip 12 and end lining 13.

Figs. 1, 2, 3 and 4 show the vertical member 15 comprising angularly disposed arms 16 and 17 provided with flanges 18 and 19, respectively, and a corrugated end wall sheet 20 formed with a flange 21 secured to the arm 16 by means of the flange 18 and the rivet 22. The flanges 18 and 21 are also preferably secured to the side wall sheet 10 by means of the rivet 22. The end wall sheet 20 is secured to the arm 17 by means of the flange 19 and the rivet 24. The flange 21 of the end wall sheet and the flange 18 of the member 15 are secured to the side sill 7 by means of the rivets 26 (Fig. 1) and to the side plate 2 by means of the rivet 27 (Fig. 1). The vertical marginal portion 28 of the end wall sheet 20 and the flange 19 of the member 15 are secured to the end sill 6 by the rivet 30 (see Fig. 2) and the corner casting 9. The vertical margin 28 of the end wall sheet 20 and the flange 19 of the member 15 are secured to the roof structure by the upper corner casting 5. (The upper part of the corrugated end wall sheet performs the functions of the usual horizontal beam secured to the tops of the corner posts and called an end plate.) The arms 16 and 17 of the vertical member 15 are welded to the underframe structure, as shown at 33 (Fig. 4) and these arms are also securely welded to the roof structure, as shown at 34 (Fig. 4), thus means are provided to secure the arms 16—17 of the member 15 to the roof structure 1 and underframe structure 6, respectively, and also means are provided to secure the flange 21 of the end wall sheet 20 and the adjacent marginal portion 28 of the end wall sheet to the roof structure 1 and underframe structure 6, respectively. Also means are provided to secure the arms 16 and 17 of the member 15 to the flange 21 of the end wall sheet 20 and the body of the end wall sheet 20, respectively, to form a box structural element. In other words, we have shown and described a corner post comprising a box structural element secured to the roof structure and underframe structure, respectively, to provide a very strong beam therebetween and to resist torque.

The end wall sheet 20 is reinforced by a plurality of substantially parallel major corrugations 40 with a plurality of minor corrugations 41 disposed therebetween, wherein the major corrugations 40 extend around the corner of the car and merge into the end wall sheet 20 adjacent the end wall sheet flange 21. The minor corrugations 41 spring from the end wall sheet (at 42) adjacent the end wall sheet flange 21 and extend around the corner and merge into the end wall sheet 20 between the major corrugations (at 43). The rivets 24, or other attaching means, to secure the end wall sheet 20 to the vertical member 15 are positioned between the minor 41 and major 40 corrugations. The flange 21 on the end wall sheet is formed on a relatively large radius 45 to form an arch, to resist external horizontal forces and furthermore to increase the appearance of the car. The corrugations 40—41 stiffen the arch.

Figs. 1 and 3 also show a means to maintain the arms 16 and 17 of the member 15, and the arch 47 in spaced relation to each other, which means in the form shown, comprises a horizontally disposed metallic spacer or member 50 provided with a flange 51 riveted or welded to the arch 47 and inner member 15, respectively. These spacers 50 are secured either to the member 15 or the end wall sheet 20 before the two elements are assembled to form the box structural beam. A plurality of these spacers are preferably placed at spaced intervals along the length of the box structural beam.

Fig. 5 shows a modification wherein the corrugations 55 merge into the end wall sheet 20 substantially in line with the means 56 of the end wall sheet to the flange 19 and the vertical member 15.

Fig. 6 shows a corner post wherein the corrugations 60 in the end wall sheet 20 merge into the arch 47 of the end wall sheet 20.

Fig. 7 shows a construction wherein the corrugations 65 extend around the corner of the car and merge into the end wall sheet 20 adjacent the arm 16 with the outer portions 66 of the corrugations substantially flush with the outer surface 67 of the side wall of the car, while Fig. 8 shows the corrugations 69 extending in their full depth around the corner of the car.

Figs. 9 and 10 show a modification wherein the major corrugations 72 in the end wall sheet 20 extend around the corner of the car and merge into the end wall sheet adjacent the arm 16 of the inner member 15 of the corner post. The rivets 73 are positioned adjacent the ends of the major corrugations 72. The minor corrugations 74 spring from the end wall sheet somewhat adjacent the middle of the car 75 and merge into the end wall sheet 20 adjacent the arm 17 of the inner member of the corner post. The rivets 76 are positioned adjacent the ends of the minor corrugations 74. The major corrugations 72 preferably increase in depth and width from their ends toward their medial portions to provide relatively strong beams and the rivets 76 between the major corrugations 72 cause these major corrugations to function as restrained beams. The minor corrugations 74 stiffen the end wall sheet between the major corrugations 72. Fig. 9 is a section on line 9—9 of Fig. 10.

Figs. 11 and 12 show a construction wherein the end wall sheet 20 is provided with a plurality of parallel corrugations extending between the two corner posts of the car wherein preferably alternate corrugations 80 extend around the corner of the car and other corrugations 81 merge into the end wall sheet adjacent the inner member 15 of the corner posts. Fig. 11 is a section on line 11—11 of Fig. 12.

In the construction shown in Figs. 9, 10, 11 and 12 part of the load imposed upon the corrugations is transmitted to the inner arm of the inner member of the corner post and part of such load is transmitted to the outer arm of the inner member of the corner post (and thence partially to the side wall sheet).

Fig. 13 shows a corner post comprising an inner member 15 formed with angularly disposed arms 16 and 17 and an outwardly curved outer member 84 with the vertical margins thereof secured to the arms 16 and 17, respectively, of the inner member 15. The inner 15 and outer 84 members are both preferably secured to the roof structure 1 and underframe structure 6, respectively, so that the inner member and outer mem-

ber cooperate to form a box structure between the roof structure 1 and underframe structure 6. The outer member 84 is formed with substantially parallel corrugations 85 which spring from the outer member adjacent the arm 16 of the inner member 15 and extend to the opposite edge of the outer member 84 to form a corrugated marginal portion. The end wall sheet 86 is formed with a plurality of substantially horizontal corrugations 87 which extend to the edge 88 of the sheet 86 and engage and preferably fit the corrugated marginal portion of the outer member 84 of the corner post and are secured thereto 90 to form cooperation therebetween; that is, in effect, to provide continuations of the corrugations 87 in the end wall sheet. The rivet 91 secures the outer member 84 to the flange 19 and also secures the end wall sheet 86 to the flange 19. The rivets 92 secure the corrugated end wall sheet 86 to the outer member 84 so as to form a continuation of the corrugations. The end wall sheet preferably overlaps (as shown) the corrugated marginal portion of the outer piece to provide for adjustability necessary due to the various widths of the car and variation in width of corrugated end sheets.

Fig. 14 is similar to Fig. 13 and shows a corrugated end wall sheet 94 welded (95) to the outer member 96 of the corner post independently of the means (rivet 97) which secures the end wall sheet 94 to the flange 19 of the inner member of the corner post. A filler 98 may be necessary.

Fig. 15 is similar to Fig. 14 and shows the outer member 100 of the corner post extending inwardly beyond the flange 19 of the inner member 15 of the corner post and wherein the welding means 101 of securing the end wall sheet 102 to the outer member 100 is independent of the means (rivet 104) which secures the outer member 100 to the inner member of the corner post.

The accompanying drawings illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof, within the scope of the claims, will occur to persons skilled in the art.

We claim:

1. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms each provided with a flange, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said member flanges, and means to secure said flange of the wall sheet to the other of said member flanges whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said member, said wall sheet being provided with a plurality of horizontal corrugations which merge into the wall sheet substantially in line with the last mentioned securing means.

2. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms each provided with a flange, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said member flanges, and means to secure said flange of the wall sheet to the other of said member flanges whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said member, said wall sheet being provided with a plurality of horizontal corrugations which merge into said arch.

3. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms each provided with a flange, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said member flanges, and means to secure said flange of the wall sheet to the other of said member flanges whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said member, said wall sheet being provided with a plurality of horizontal corrugations which extend around said arch at a substantially constant depth and merge into said flange.

4. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms each provided with a flange, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said member flanges, and means to secure said flange of the wall sheet to the other of said member flanges whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said member, said wall sheet being provided with a plurality of horizontal corrugations which merge into the portion of the wall sheet forming the box structural beam.

5. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms each provided with a flange, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said member flanges, and means to secure said flange of the wall sheet to the other of said member flanges whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said members, said wall sheet being provided with a plurality of horizontal corrugations which extend around the arch and merge into said flange, and a plurality of spacers so positioned as to maintain said arms; said wall sheet flange and said wall sheet body part in spaced relation to each other.

6. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms each provided with a flange, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said member flanges, and means to secure said flange of the wall sheet to the other of said member flanges whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said member, said wall sheet provided with a plurality of horizontal major corrugations which extend around the corner of the car and merge into the end wall flange, said wall sheet also provided with a plurality of horizontal minor corrugations which do not extend around the corner of the car.

7. In a railway car having a corner post structure comprising a vertical inner member comprising angularly disposed arms each provided with a flange, and an outer member curved outwardly on a relatively large radius with the vertical margins thereof secured to said arms, respectively, said outer member formed with stiffening

corrugations which spring therefrom adjacent one vertical margin and extend to the opposite edge of the outer member to form a corrugated marginal portion in combination with an end wall sheet formed with a plurality of horizontal corrugations extending to the edge of the sheet which engage and fit the corrugated marginal portion of the outer member whereby the corrugations in the outer member form continuations of the corrugations in the end wall sheet.

8. A structure as defined in claim 7 wherein the end wall sheet is secured to said outer member independently of the means which secure said outer member to said inner member.

9. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms each provided with a flange, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said member flanges, and means to secure said flange of the wall sheet to the other of said member flanges, whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said member, said wall sheet provided with a plurality of horizontal major corrugations and a plurality of minor corrugations which extend around the corner of the car and merge into said sheet flange.

10. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said arms, and means to secure said flange of the wall sheet to the other of said arms, whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said member, said wall sheet provided with a plurality of horizontal corrugations which extend around the corner of the car and merge into said sheet flange.

11. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms each provided with a flange, an end wall sheet comprising a body part formed with a flange, means to secure said body part of the wall sheet to one of said member flanges, and means to secure said flange of the wall sheet to the other of said member flanges, whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch between the arms of said member, said wall sheet provided with a plurality of horizontal corrugations which extend around the corner of the car and merge into said sheet flange, the depth of said corrugations decreasing from said body part toward the line of merging into said sheet flange.

12. In a railway car having spaced apart corner posts each comprising angularly disposed arms wherein one of said arms has a flange disposed crosswise of the car and the other of said arms has a flange disposed lengthwise of the car, a metallic sheet having formed therein a plurality of substantially horizontal corrugations, each vertical edge of said sheet being formed with a flange, said last mentioned flanges being secured to said lengthwise disposed flanges and the body part of said sheet being secured to said crosswise disposed flanges to form box structural beams, the flanges of said sheet being formed on curves of relatively large radius to form arches between said arms, said corrugations extending around said arches and merging into said sheet flanges adjacent said lengthwise disposed flanges.

13. In a railway car having spaced apart corner posts each comprising angularly disposed arms wherein one of said arms has a flange disposed crosswise of the car and the other of said arms has a flange disposed lengthwise of the car, a metallic sheet having formed therein a plurality of substantially horizontal major corrugations and a plurality of minor corrugations disposed between said major corrugations and adjacent the ends thereof, each vertical edge of said sheet being formed with a flange, said last mentioned flanges secured to said lengthwise disposed flanges and the body part of said sheet being secured to said crosswise disposed flanges to form box structural beams, the flanges of said sheet being formed on curves of relatively large radius to form arches between said arms, said corrugations extending around said arches and merging into said sheet flanges adjacent said lengthwise disposed flanges.

14. In a railway car having a corner structure comprising a vertical member comprising angularly disposed arms, an end wall sheet comprising a body part formed with a flange, means to secure the body part of said wall sheet to one of said arms, and means to secure said flange of the wall sheet to the other of said arms whereby a box structural beam is provided, the flange of the wall sheet being formed on a curve of relatively large radius to form an arch substantially between the arms of said member, said wall sheet provided with a plurality of horizontal corrugations which terminate and merge in the curved portion of said wall sheet flange.

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